Electronic Version
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Claims

[c1] 1. A method of correcting a lithographic process, comprising the steps of:
performing a physical vapor deposition (PVD) process to form a thin film over a wafer, wherein an overlay mark on the wafer has a positional shift that depends on the target consumption in the PVD process and a formula relating the two can be derived;
obtaining a compensation value from the formula;
forming a photoresist layer over the thin film; and
performing a lithographic process to pattern the photoresist layer, wherein the compensation value is fed back to correct parameters used in lithographic process.

[c2] 2. The method of claim 1, wherein the step of obtaining the compensation value comprises obtaining a compensation value for each wafer.

[c3] 3. The method of claim 1, wherein the step of obtaining the compensation value comprises obtaining a compensation value for each batch containing a specific number of wafers.

[c4] 4. The method of claim 1, wherein the formula relating

the target consumption and degree of shifting is recorded within a control system that also computes the compensation value and feeds the compensation value back to correct the lithographic operation.

[c5] 5. The method of claim 4, wherein the control system further records the target consumption in each PVD process and corresponding shift in overlay mark position so that the formula can be renewed.

[c6] 6. The method of claim 4, wherein the control system comprises an advanced process control (APC) system.

[c7] 7. The method of claim 1, wherein the positional shift is in a direction towards a center of the wafer.

[c8] 8. The method of claim 1, wherein the positional shift is in a direction away from a center of the wafer.

[c9] 9. The method of claim 1, wherein the positional shift is a rotational shift.

[c10] 10. A method of forming an overlay mark on a wafer having a material layer thereon, comprising the steps of:
forming a opening pattern in the material layer to serve as an outer mark;
forming a first film layer on the material layer;
removing a portion of the first film layer to expose a

portion of the material layer;
performing a physical vapor deposition (PVD) process to form a second film layer over the first film layer, wherein the deposited second film layer causes a shift in an overlay mark such that the degree of shifting is related to the target consumption in the PVD process and a formula relating the two can be derived;
obtaining a compensation value from the formula;
forming a photoresist layer over the second film layer; and
performing a lithographic process to form an inner mark, wherein the compensation value is fed back to correct parameters used in lithographic process.

[c11] 11. The method of claim 10, wherein the step of obtaining the compensation value comprises obtaining a compensation value for each wafer.

[c12] 12. The method of claim 10, wherein the step of obtaining the compensation value comprises obtaining a compensation value for each batch containing a specific number of wafers.

[c13] 13. The method of claim 10, wherein the formula relating the target consumption and degree of shifting is recorded within a control system that also computes the compensation value and feeds the compensation value

back to correct the lithographic operation.

[c14] 14. The method of claim 13, wherein the control system further records the target consumption in each PVD process and corresponding shift in overlay mark position so that the formula can be renewed.

[c15] 15. The method of claim 13, wherein the control system comprises an advanced process control (APC) system.

[c16] 16. The method of claim 10, wherein the shift is in a direction towards a center of the wafer.

[c17] 17. The method of claim 10, wherein the shift is in a direction away from a center of the wafer.

[c18] 18. The method of claim 10, wherein the shift is a rotational shift.

[c19] 19. The method of claim 10, wherein the material layer comprises an insulation material layer.

[c20] 20. The method of claim 10, wherein the first film layer comprises a first metallic layer.

[c21] 21. The method of claim 10, wherein the second film layer comprises a second metallic layer.

[c22] 22. A method of correcting a lithographic process, comprising the steps of:

performing a physical vapor deposition (PVD) process to form a thin film over a wafer, wherein an overlay mark on the wafer has a positional shift that depends on the target consumption in the PVD process and a formula relating the two can be derived;
obtaining a compensation value from the formula;
forming a photoresist layer over the thin film;
combining the first compensation value with the data in a lithographic correction system to produce a second compensation value; and
performing a lithographic process to pattern the photoresist layer, wherein the second compensation value is fed back to correct parameters used in lithographic process.

[c23] 23. The method of claim 22, wherein the step of obtaining the first compensation value comprises obtaining a first compensation value for each wafer.

[c24] 24. The method of claim 22, wherein the step of obtaining the first compensation value comprises obtaining a first compensation value for each batch containing a specific number of wafers.

[c25] 25. The method of claim 22, wherein the formula relating the target consumption and degree of shifting is recorded within a control system that also computes the

first compensation value and feeds the second compensation value back to correct the lithographic operation.

[c26] 26. The method of claim 25, wherein the control system further records the target consumption in each PVD process and corresponding shift in overlay mark position so that the formula can be renewed.

[c27] 27. The method of claim 25, wherein the control system comprises an advanced process control (APC) system.

[c28] 28. The method of claim 22, wherein the positional shift is in a direction towards a center of the wafer.

[c29] 29. The method of claim 22, wherein the positional shift is in a direction away from a center of the wafer.

[c30] 30. The method of claim 22, wherein the positional shift is a rotational shift.

[c31] 31. The method of claim 22, wherein the data in the lithographic correction system comprises the data obtained from a photo-exposure station.